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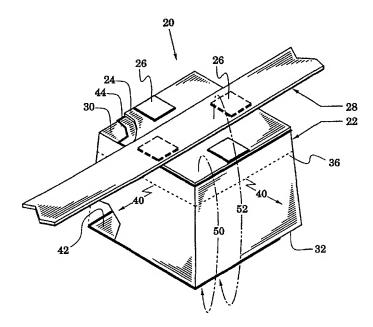
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(54) Title: LIGHT-EMITTING STRUCTURES



(57) Abstract: Light-emitting structures of reduced size are realized with combinations of light-emitting diodes (22), resistive and conductive films (24, 44), and interconnect members (28). Other embodiments are provided which simplify fabrication and assembly.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER H01L33/00 (2006.01) i According to International Patent Classification (IPC) or to both national classification and IPC FIELDS SEARCHED B Minimum documentation searched (classification system followed by classification symbols) IPC: H01L H05B Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPI PAJ EPODOC CNPAT LIGHT EMITTING DIODE LED ANODE CATHODE RESIST+ CONTACT C. DOCUMENTS CONSIDERED TO BE RELEVANT Relevant to claim No. Category* Citation of document, with indication, where appropriate, of the relevant passages JP2000-101150A (NODA TADAO) 07.Apr 2000 (07.04.2000) 1-37 Х paragraph [0005]-[0012]; figs. 1-2 JP2-283070A (FUJI ELECTRIC CO LTD) 20.Nov 1990 (20.11.1990) 1-37 Х page 456, line 1-page 458, line 4; figs. 1-5 JP64-32671A (HITACHI LTD) 02.Feb 1989 (02.02. 1989) 1-37 Х page 391, line 1-page 394; figs. 1-2 JP11-251641A (KYORAKU SANGYO KK) 17.Sep 1999(17.09.1999) the whole document 1-37 A CN1437773A (DUPONT DISPLAY INC) 20.Aug 2003 (20.08.2003) the whole document 1-37 Further documents are listed in the continuation of Box C. See patent family annex. later document published after the international filing date Special categories of cited documents: or priority date and not in conflict with the application but document defining the general state of the art which is not cited to understand the principle or theory underlying the considered to be of particular relevance earlier application or patent but published on or after the "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve international filing date an inventive step when the document is taken alone "L" document which may throw doubts on priority claim (S) or document of particular relevance; the claimed invention which is cited to establish the publication date of another cannot be considered to involve an inventive step when the citation or other special reason (as specified) document is combined with one or more other such "O" document referring to an oral disclosure, use, exhibition or documents, such combination being obvious to a person skilled in the art "&"document member of the same patent family document published prior to the international filing date but later than the priority date claimed Date of mailing of the international search report 0 1 • FEB 2007 (0 1 • 0 2 • 2 0 0 7) Date of the actual completion of the international search 19.Jan 2007(19.01.2007) Name and mailing address of the ISA/CN Authorized officer The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China CUI, Shangke Telephone No. (86-10)62085818 Facsimile No. 86-10-62019451

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB2004/004475

| Box No | o. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet) | | | |
|--|---|--|--|--|
| This in | ternational search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons: Claims Nos.: | | | |
| 2. 🗌 | Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely: Claims Nos.: because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically: | | | |
| 3. 🗆 | Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a). | | | |
| Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet) | | | | |
| The co | ternational Searching Authority found multiple inventions in this international application, as follows: mmon technical features of claims 1, 18 and 28 are all disclosed by prior art, thus claims 1-17, 18-27 and 28-37 lack unity under 3.1, 13.2 and 13.3. | | | |
| 1. 🗆 | As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims. | | | |
| 2. 🛛 | As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of any additional fee. | | | |
| 3. 🗀 | As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.: | | | |
| 4. | No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: | | | |
| Remar | k on protest The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee. | | | |
| | The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation. | | | |
| | No protest accompanied the payment of additional search fees. | | | |

Form PCT/ISA/210 (continuation of first sheet (2)) (April 2005)

INTERNATIONAL SEARCH REPORT Information on patent family members

International application No. PCT/IB2004/004475

| Patent document | Publication data | Patent family member(s) | Publication data |
|------------------------|------------------|-------------------------|------------------|
| Cited in search report | | | |
| JP2000101150A | 07.04.2000 | none | |
| JP2283070A | 20.11.1990 | none | |
| JP6432671A | 02.02.1989 | none | |
| JP11251641A | 17.09.1999 | none | |
| CN1437773A | 20.08.2003 | WO0199207A | 27.12.2001 |
| | | CA2408321A | 27.12.2001 |
| | | AU6853801A | 02.01.2002 |
| | | US2002036291A | 28.03.2002 |
| | | EP1292996A | 19.03.2003 |
| | | US2003146436A | 07.08.2003 |
| | | JP2003536227T | 02.12.2003 |
| | | US2005184306A | 25.08.2005 |

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